

## OBSERVATIONS ON THE ACHEULEAN OF TABUN CAVE, ISRAEL

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The cave of Tabun, on the southern bank of Nahal Hamearot in Mount Carmel, has become a yardstick in Levantine Prehistory - indeed, in world prehistory - during Dorothy Garrod's initial excavations in the 30's. The roughly 25 m thick deposits exposed by those excavations contained a long sequence of Lower (layers G-E) and Middle (layers D-B) Palaeolithic occurrences and a Middle Palaeolithic human burial. Published some 60 years ago (GARROD & BATE 1937), the Tabun sequence (Fig. 1) still provides the most important reference for the late Lower Palaeolithic and the Middle Palaeolithic of Western Asia (e.g., BAR-YOSEF 1994; GOREN-INBAR 1994).

Garrod's layers do not always conform to the very complex natural stratigraphy in the cave, largely affected by bending and sliding into a central "swallow-hole". This entailed some mixture of the cultural content in Garrod's excavations in the upper half of the sediments, and considerably more so in the lower half, which was far more affected by the sliding.

New Excavations were undertaken in Tabun by A. J. Jelinek between 1967 and 1972. Jelinek re-excavated Garrod's layers C, D and the upper part of E. Close attention to the natural sedimentation and a meticulous registration of finds led to a much finer stratigraphy. New light was shed on the Middle Palaeolithic and on the contents of layer E (JELINEK 1977, 1982; JELINEK *et al.* 1973).

Our excavations (A.R), started in 1975, continue those of Jelinek in rechecking the lower part of the Tabun sequence, lower Layer E and Layers F and G, as seen in Garrod's main section. The stratigraphical sub-divisions and mode of registration follow those established during Jelinek's excavations. In the present article, the transition zone between Garrod's Layers F and E will be described for the first time since the initial excavations in the 30's.

### The Lower Palaeolithic

Garrod recognised the following cultural entities in the Lower Palaeolithic of Tabun, from oldest to youngest:

*Layer G*, the beginning of occupation in the cave, has the smallest number of finds per sediment volume among all of Tabun layers. The assemblage is poorly

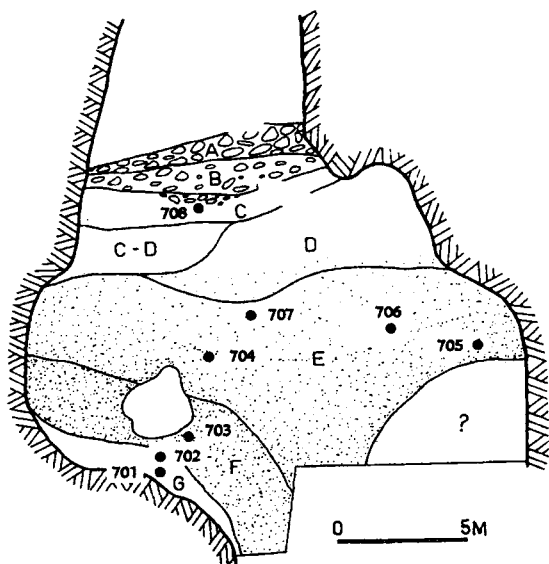


Fig. 1. Tabun Cave, main section looking south, with location and number of RTL samples.

standardized and includes only a small number of tool types, mostly rather atypical. The commonest element was a denticulated flake. No bifaces were found in Layer G. Hence, in accordance with the European terminology of the time, the series was labeled Tayacian, the generic name for Lower Palaeolithic occurrences without bifaces.

Garrod's assemblage from *Layer F* includes numerous bifaces, racloirs and other tool types which were qualified as upper Acheulean. However, it seems that the content of Layer F was heavily mixed with that of E. Both layers fall very steeply into the swallow-hole in the central chamber, and sometimes the boundary between them was not noticed (GARROD & BATE 1937: 70, footnote). Current examination of the sections left by Garrod suggest that Layer F contains approximately 1/4 to 1/3 of layer E by volume.

The following *Layer E*, some 7 m thick, was subdivided by Garrod into four sub-units Ea, Eb, Ec and Ed. The whole was analysed as containing a single cultural entity, initially termed Micoquian by Garrod, again based upon the European nomenclature of the time. Following Rust's excavations in the Syrian Rockshelter Yabrud I (RUST 1950), Garrod recognised the Yabrudian character of her Layer E (GARROD 1956). The Yabrudian is characterised by numerous bifaces and numerous side scrapers made on thick flakes, frequently side-struck, step-retouched, typically of the transversal, dejeté or convergent forms. The Yabrudian is non-Levallois and has practically no blades.

Again conforming to Rust's observations at Yabrud, Garrod noticed the presence of a Pre-Aurignacian horizon close to the top of Layer E, between her *sub-layers Ea and Eb* (GARROD 1956), with blades approaching Upper Palaeolithic quality. At Tabun, however, contrary to Yabrud, this assemblage did not so much resemble the

Aurignacian, and Garrod proposed for it the term Amudian. The Yabrudian is covered by the oldest Middle Palaeolithic, biface-free assemblage of *Layer D*.

## Dating

Initially, the Tabun sequence was believed to cover the Last Interglacial - Last Glacial periods (GARROD & BATE 1937, JELINEK *et al.* 1973), that is, Isotope Stages 5 through 2. Recently obtained TL dates (MERCIER & VALLADAS 1994; MERCIER *et al.* 1995) and ESR dates (GRUN *et al.* 1992; PORAT *et al.* 1994) indicate a considerably larger antiquity (Table 1). The youngest Middle Palaeolithic occupation is now placed around 100 Ka and the middle of Layer E, around 300 Ka. Samples for Radiothermoluminescence (RTL) dating were collected in 1995 (by S.L.) (Fig. 1) and were processed in the Laboratory of Environment, Radioactivity and Radiothermoluminescence of Moscow State University (Table 1). Dating procedures follow the method developed by Vlasov and Kulikov (VLASOV & KULIKOV 1988, 1989).

We note the close match between the RTL and the TL dates for Layers C and E. This would lend credence to the RTL dates obtained for the oldest layers in Tabun, F and G. Dated for the first time, Layer F is placed around 450 Ka and Layer G, around 630 Ka.

## The renewed excavations

In Layer E Jelinek has distinguished an alternation between biface-rich and scraper-rich beds. Jelinek interpreted the two as climatically determined varieties, suggesting that bifaces were more numerous in colder conditions. Jelinek further suggested that the blade-rich Amudian was also an adaptation to some environmental requirements, and hence need not be considered as a separate cultural entity. Accordingly, he created the term "Mugharan Tradition" to

**Table 1. Dating Tabun layers by various methods\***

| Tabun Layer | ESR    |        | TL                         | U-Series                          | RTL |         |
|-------------|--------|--------|----------------------------|-----------------------------------|-----|---------|
|             | EU     | LU     |                            |                                   |     |         |
| B           | 86±11  | 103±16 |                            | 50.7±0.2<br>97.8±0.4<br>101.7±1.4 |     |         |
| C           | 102±17 | 119±11 | 171±17<br>212±22<br>244±28 | 105±2.6                           | 708 | 108±27  |
| D           | 122±20 | 166±20 | 263±27<br>270±22           | 110±0.9                           |     |         |
| Ea          | 154±34 | 188±31 |                            | 159±1.3<br>168±2.6                | 707 | 270±60  |
| Eb          | 151±21 | 168±15 | 306±33                     |                                   | 706 | 260±60  |
| Ec          | 176±10 | 199±7  |                            |                                   | 705 | 340±80  |
| Ed          | 182±15 | 213±46 | 331±30                     |                                   | 704 | 410±110 |
| F           |        |        |                            |                                   | 703 | 480±120 |
| G           |        |        |                            |                                   | 702 | 610±150 |
|             |        |        |                            |                                   | 701 | 630±160 |

\* After GRUN et al. 1992; MCDERMOTT et al. 1993; MERCIER & VALLADAS 1994; MERCIER et al. 1995.

encompass the three occurrences within Layer E (JELINEK 1982). It may be noted, however, that the extreme scarcity of any blade form in the Yabrudian stands in a stark contradiction to the abundant blades of the Amudian, especially that these blades were manufactured in a technology similar to that used in the Upper Palaeolithic (RONEN 1992). These technological discrepancies render the concept of a single Mugharan Tradition problematic.

Our excavations (A.R.) revealed in Layer G, the oldest deposit in Tabun, a phase of pedogenesis followed by gley formation between Layers G and F (RONEN & TSATSKIN 1995; TSATSKIN *et al.* 1995). Layer G is indeed poor in finds, as noted by Garrod. With only a small volume of sediment affected, the nature of the assemblage remains unclear. The G/F bound-

ary is clear, but Layers F and E are lithologically similar (RONEN & TSATSKIN 1995). The assemblages from the transition zone lower E - upper F are reported in the following pages.

#### Lithic analysis

The series studied here originate in Squares 47 and 48, in the south-western corner of Garrod's deep sounding (Fig. 2). The sediments bend ca. 40° northward and ca. 10° westward into the swallow-hole. Our results should be regarded as preliminary because

1. Only a sample of the excavated material is analysed here, and
2. minute stratigraphical correlations still under way might slightly alter the placement of some artifacts.

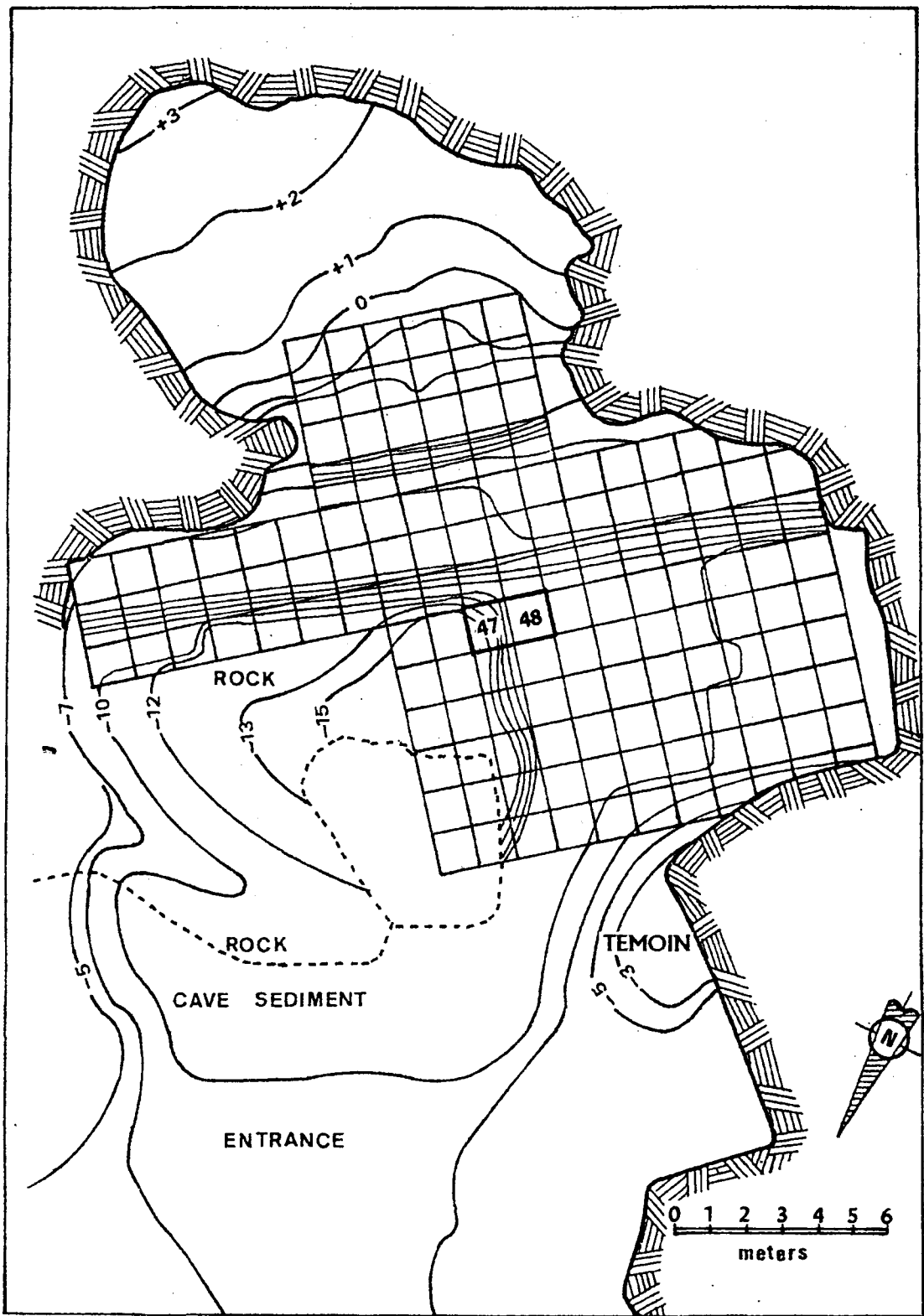


Fig. 2. Plan of Tabun

The overall picture, however, is not likely to change to any considerable degree. The Upper Series of this study was found in square 48, layers 62 through 64. The Lower Series originates in both squares 47

and 48, layers 65 through 68. The two series include 2473 items of flint, including 1891 flakes and flake tools which are the subject of the present study. Bifaces and cores were not studied.

**Table 2. Major industrial elements**

| <b>Type</b>                | <b>Lower Series</b> |          | <b>Upper Series</b> |          |
|----------------------------|---------------------|----------|---------------------|----------|
|                            | <b>N.</b>           | <b>%</b> | <b>N.</b>           | <b>%</b> |
| Tools                      | 385                 | 25.43    | 331                 | 34.52    |
| Cores                      | 221                 | 14.60    | 134                 | 13.97    |
| Debitage                   | 701                 | 46.30    | 409                 | 42.65    |
| Debris                     | 207                 | 13.67    | 85                  | 8.86     |
| <b>Total</b>               | <b>1514</b>         |          | <b>959</b>          |          |
| <b>Debitage</b>            |                     |          |                     |          |
| Primary element (complete) | 23                  | 3.28     | 10                  | 2.44     |
| Broken Primary element     | 21                  | 3.00     | 25                  | 6.11     |
| Flakes (complete)          | 158                 | 22.54    | 100                 | 24.45    |
| Broken Flakes              | 347                 | 49.50    | 206                 | 50.37    |
| Blades (complete)          | 34                  | 4.85     | 18                  | 4.40     |
| Broken Blades              | 44                  | 6.28     | 21                  | 5.13     |
| Biface spall               | 54                  | 7.70     | 9                   | 2.20     |
| CTE                        | 20                  | 2.85     |                     |          |
| <b>Total</b>               | <b>701</b>          |          | <b>409</b>          |          |
| <b>Debris</b>              |                     |          |                     |          |
| Chunks                     | 117                 | 56.52    | 37                  | 10.59    |
| Pebbles                    | 12                  | 5.80     | 9                   | 43.53    |
| Edge flakes/Spall          | 78                  | 37.68    | 39                  | 45.88    |
| <b>Total</b>               | <b>207</b>          |          | <b>85</b>           |          |

**Table 3. Metrical data of tools and unretouched flakes in Lower Series**

|                  | <b>Tools (241)</b> |             | <b>Flakes (235)</b> |             | <b>T</b> | <b>Prob&gt;T</b> |
|------------------|--------------------|-------------|---------------------|-------------|----------|------------------|
|                  | <b>Mean</b>        | <b>S.D.</b> | <b>Mean</b>         | <b>S.D.</b> |          |                  |
| <b>Length</b>    | 48.97              | 12.955      | 43.60               | 12.06       | -4.6778  | 0.0001           |
| <b>Width</b>     | 32.64              | 9.988       | 30.38               | 9.20        | -2.5682  | 0.0105           |
| <b>Thickness</b> | 11.01              | 3.81        | 9.86                | 4.06        | -3.1881  | 0.0015           |

**Table 4. Metrical data of tools and unretouched flakes in Upper Series**

|                  | Tools (202) |       | Flakes (137) |       | T       | Prob>T |
|------------------|-------------|-------|--------------|-------|---------|--------|
|                  | Mean        | S.D.  | Mean         | S.D.  |         |        |
| <b>Length</b>    | 49.38       | 12.74 | 42.74        | 12.88 | -4.6735 | 0.0001 |
| <b>Width</b>     | 33.85       | 8.89  | 30.32        | 9.04  | -3.5485 | 0.0005 |
| <b>Thickness</b> | 11.03       | 4.18  | 9.27         | 4.23  | -3.7938 | 0.0002 |

**Table 5. Distribution of butts**

| Butts             | Lower Series |       | Upper Series |       |
|-------------------|--------------|-------|--------------|-------|
|                   | %            | N.    | %            | N.    |
| <b>No butt</b>    | 31           | 2.92  | 20           | 2.75  |
| <b>Removed</b>    | 113          | 10.63 | 79           | 10.88 |
| <b>Cortical</b>   | 78           | 7.34  | 55           | 7.58  |
| <b>Unprepared</b> | 318          | 29.92 | 218          | 30.03 |
| <b>Dihedral</b>   | 81           | 7.62  | 79           | 10.88 |
| <b>Faceted</b>    | 61           | 5.74  | 34           | 4.68  |
| <b>Irregular</b>  | 6            | 0.56  | 3            | 0.41  |
| <b>Unknown</b>    | 2            | 0.19  | 2            | 0.28  |
| <b>Broken</b>     | 373          | 35.09 | 236          | 32.51 |
| <b>Total</b>      | <b>1063</b>  |       | <b>729</b>   |       |

*Major elements in the assemblages*

Both series are similar in their subdivision into major elements (Table 2). Tools range high, with 1/4 to 1/3 of the total; the similar, high ratio of broken flakes is noteworthy (50% in both series), as well as the scarcity of blades. In both series no use was made of the Levallois technique.

*Metrics*

Both series are very similar in their mean size (Tables 3 and 4). In both, the largest blanks were clearly sought for tool production.

*Scar pattern*

There are two dominant dorsal scar patterns (Fig. 3): the parallel and the opposed, both forming 50% - 60% of the cases. The two series differ, however, by the natural backed pattern, with the Lower Series having a significantly higher incidence of tools made on natural backed blanks.

*Striking platforms*

The unprepared butts, cortical or not, dominate in both series, ca. 38% in each (Table 5). The unprepared together with the broken butts form over 70% of the cases. Faceted butts are very few in both series.

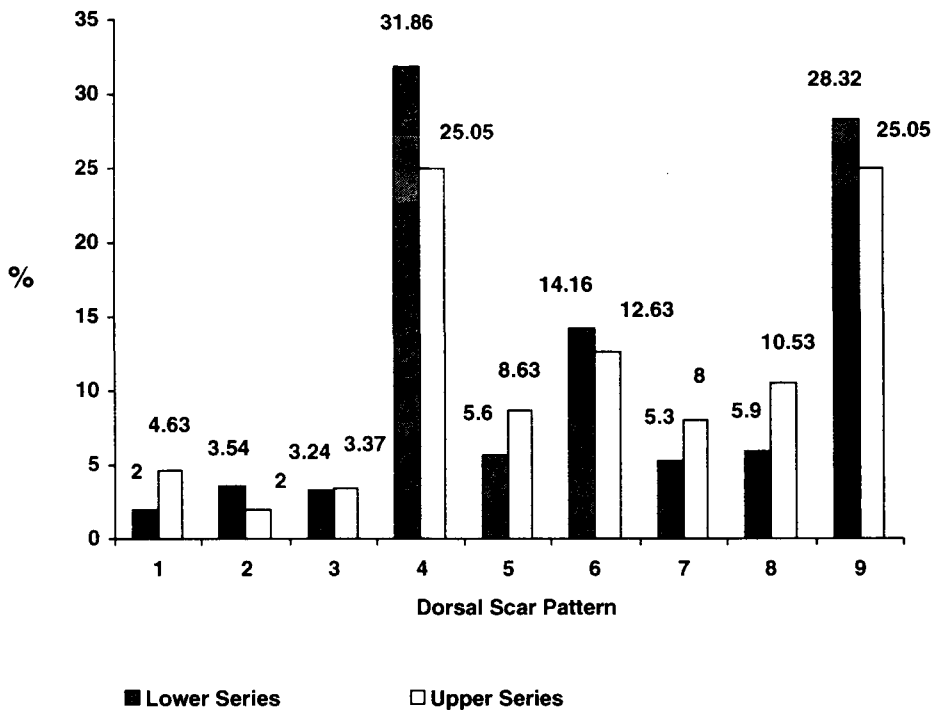


Fig. 3. Distribution of dorsal scar patterns

- |                     |               |                  |
|---------------------|---------------|------------------|
| 1 : Radial          | 4 : Parallel  | 7 : Cortex       |
| 2 : Radial/parallel | 5 : Irregular | 8 : Natural back |
| 3 : Sub-parallel    | 6 : Unknown   | 9 : Opposite     |

### Typology

The most significant typological difference is in the racloirs (Fig. 4, 9 and Table 6). In the Lower Series racloirs are fewer, governed by classical types and generally made by scale retouch (Fig. 5, 6). In the Upper Series racloirs are numerous, of diverse forms with a considerable representation of Yabrudian types (transversal, dejeté, etc. on side-struck flakes) (Fig. 7, 8). Step retouch is frequent (Fig. 10). Another difference is that natural backed

flakes are more numerous in the Lower Series.

### Retouch types

Two traits are immediately visible: fine retouching (Garrod's "nibbled") is twice more frequent in the Lower Series, whereas step retouch is some 10 times more frequent in the Upper than in the Lower Series. (Fig. 10)

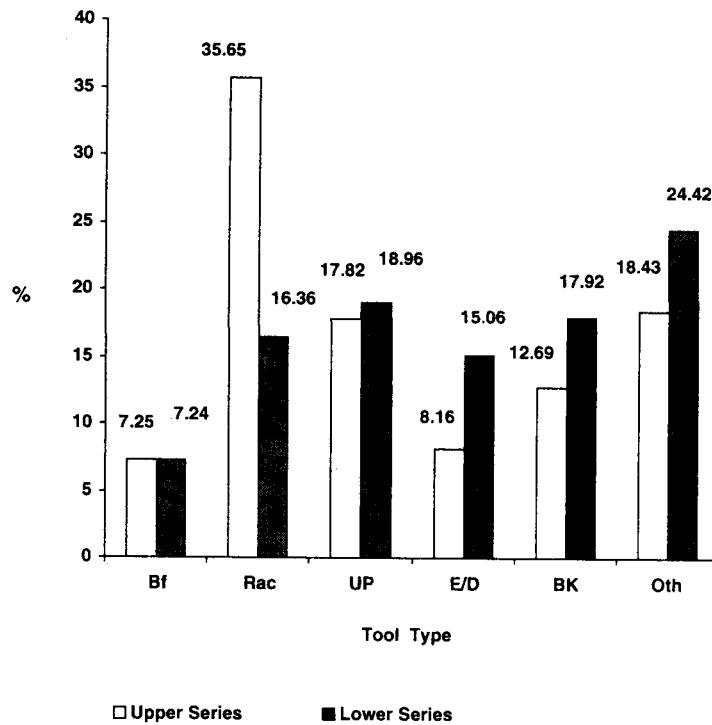


Fig. 4. Major typological groups in both Series

BF : Biface

Rac : Racloir

UP : Upper Palaeolithic

E/D : Notch/Denticulate

BK : Backed Knife

Oth : Others

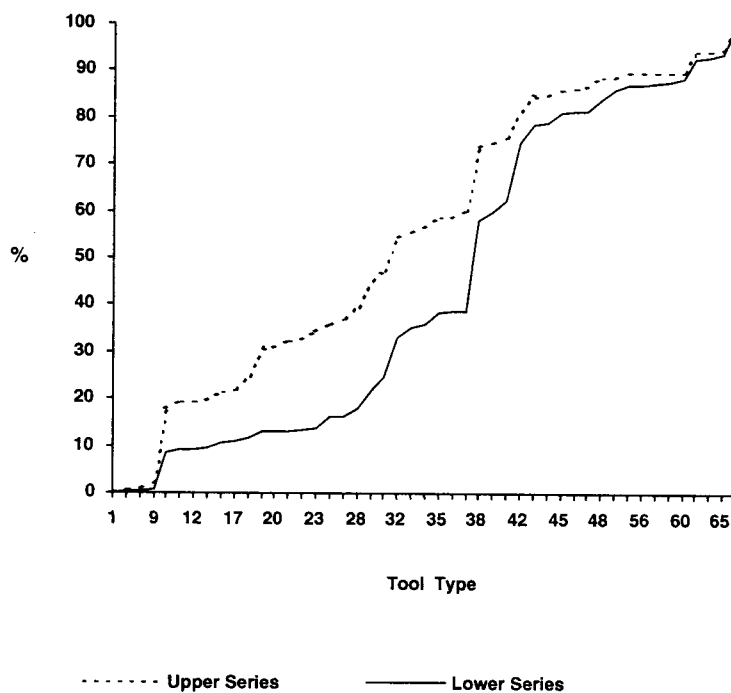


Fig. 9. Cumulative graph of Lower and Upper Series



Table 6. Typological breakdown (Bordes' List)

| N            | Type                              | Lower Series |       | Upper Series |       |
|--------------|-----------------------------------|--------------|-------|--------------|-------|
| 1            | Levallois Flake, Typical          | 0            | 0     | 1            | 0.33  |
| 2            | Levallois Flake, Atypical         | 1            | 0.28  | 1            | 0.33  |
| 8            | Limace                            | 0            | 0     | 1            | 0.33  |
| 9            | Racloir, simple straight          | 2            | 0.56  | 4            | 1.30  |
| 10           | Racloir, simple convex            | 27           | 7.56  | 48           | 15.64 |
| 11           | Racloir, simple concave           | 3            | 0.84  | 4            | 1.30  |
| 12           | Racloir double straight           | 0            | 0     | 1            | 0.33  |
| 13           | Racloir double straight - convex  | 3            | 0.84  | 1            | 0.33  |
| 15           | Racloir double straight - concave | 4            | 1.12  | 5            | 1.63  |
| 17           | Racloir double concave - convex   | 1            | 0.28  | 1            | 0.33  |
| 18           | Racloir convergent straight       | 3            | 0.84  | 9            | 2.93  |
| 19           | Racloir convergent convex         | 5            | 1.40  | 18           | 5.86  |
| 20           | Racloir convergent concave        | 0            | 0     | 1            | 0.33  |
| 21           | Racloir dejeté                    | 0            | 0     | 4            | 1.30  |
| 22           | Racloir transversal straight      | 1            | 0.28  | 2            | 0.65  |
| 23           | Racloir transversal convex        | 1            | 0.28  | 5            | 1.63  |
| 25           | Racloir on ventral side           | 9            | 2.52  | 4            | 1.30  |
| 28           | Racloir, bifacial                 | 6            | 1.68  | 7            | 2.28  |
| 30           | Grattoir                          | 14           | 3.92  | 17           | 5.54  |
| 31           | Grattoir, atypical                | 10           | 2.80  | 7            | 2.28  |
| 32           | Burin                             | 30           | 8.40  | 23           | 7.49  |
| 33           | Burin atypical                    | 8            | 2.24  | 3            | 0.98  |
| 34           | Awl                               | 2            | 0.56  | 3            | 0.98  |
| 35           | Awl atypical                      | 9            | 2.52  | 6            | 1.95  |
| 36           | Backed knife                      | 1            | 0.28  | 1            | 0.33  |
| 37           | Backed knife, atypical            | 0            | 0     | 4            | 1.30  |
| 38           | Natural Backed Knife              | 69           | 19.33 | 42           | 13.68 |
| 39           | Raclette                          | 7            | 1.96  | 2            | 0.65  |
| 40           | Truncation                        | 8            | 2.24  | 3            | 0.98  |
| 42           | Notch                             | 44           | 12.32 | 18           | 5.86  |
| 43           | Denticulate                       | 14           | 3.92  | 9            | 2.93  |
| 44           | Burin, alternating                | 1            | 0.28  | 1            | 0.33  |
| 45           | Retouch on ventral side           | 8            | 2.24  | 4            | 1.30  |
| 46           | Retouch, alternating              | 1            | 0.28  | 1            | 0.33  |
| 48           | Steep retouch, alternating        | 9            | 2.52  | 7            | 2.28  |
| 54           | Notch on end                      | 3            | 0.84  | 4            | 1.30  |
| 56           | Rabot                             | 1            | 0.28  | 0            | 0     |
| 58           | Tanged piece                      | 1            | 0.28  | 0            | 0     |
| 62           | Divers                            | 16           | 4.48  | 14           | 4.56  |
| 64           | Emira Point                       | 1            | 0.28  | 0            | 0     |
| 65           | Emiroid                           | 2            | 0.56  | 1            | 0.33  |
| 67           | Used item                         | 23           | 6.44  | 16           | 5.21  |
| <b>Total</b> |                                   | <b>357</b>   |       | <b>307</b>   |       |

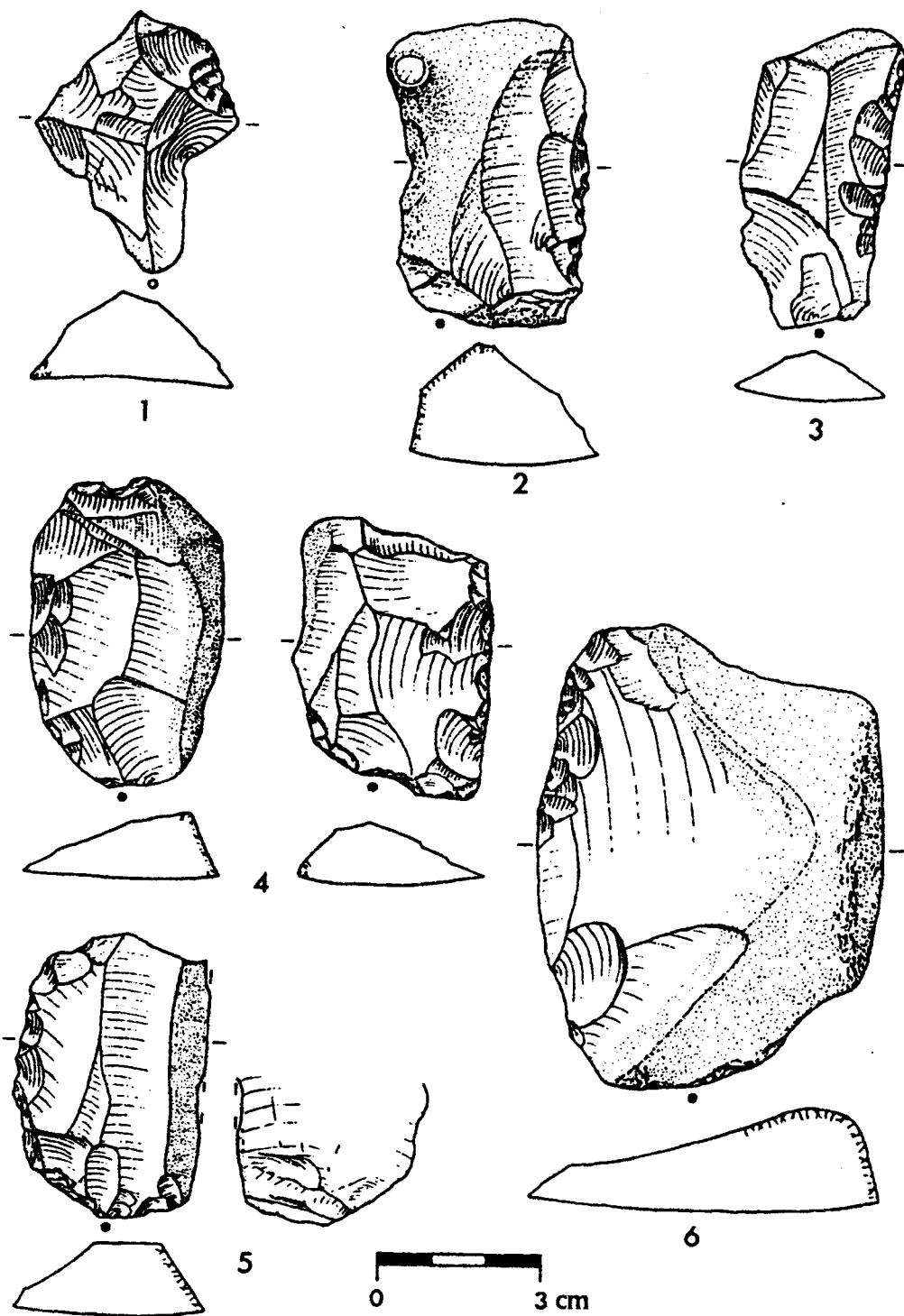


Fig. 5. Lower Series, racloirs

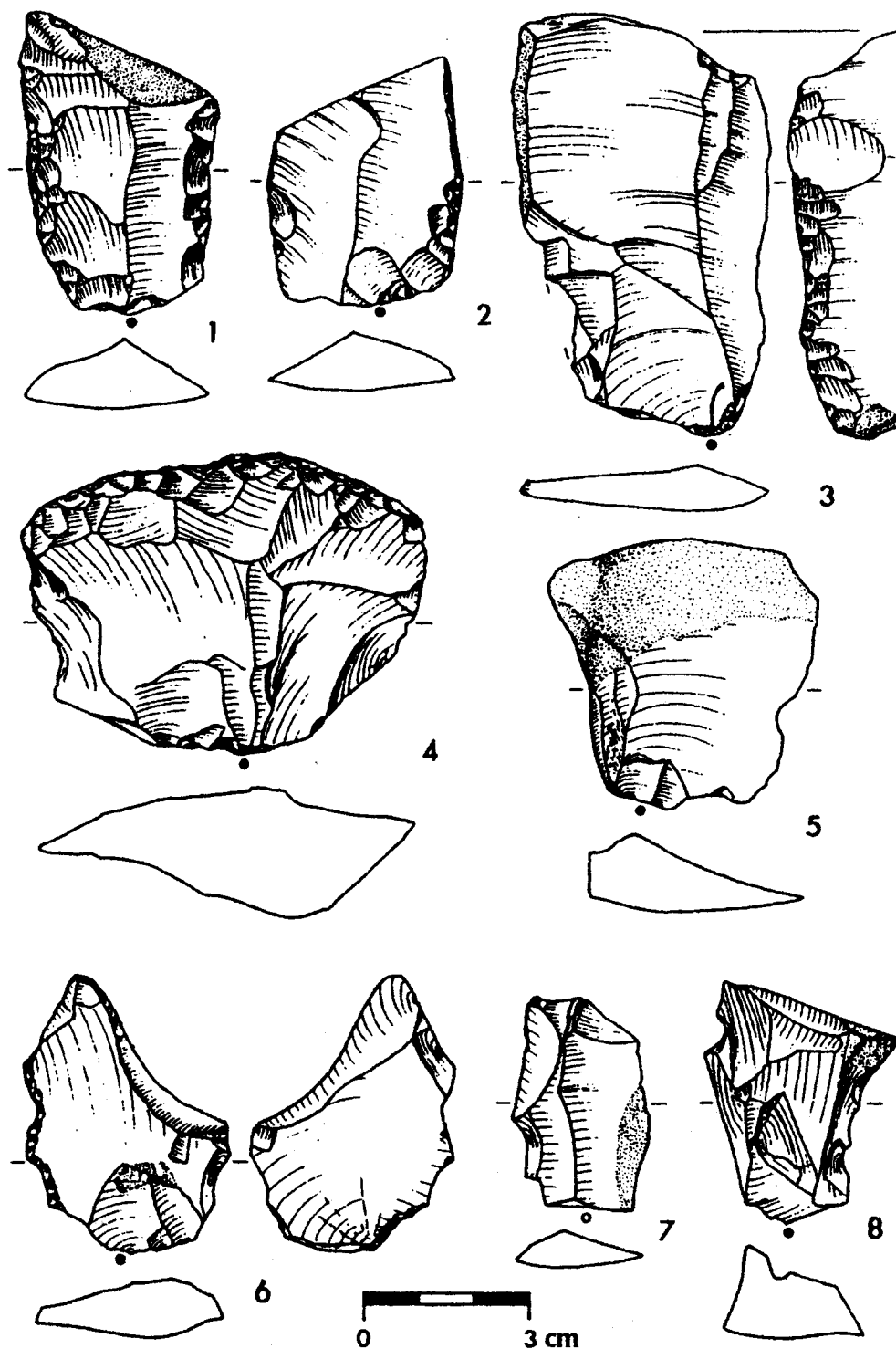


Fig. 6. Lower Series, 1-4, racloirs; 5,7,8, notches; 6, burin

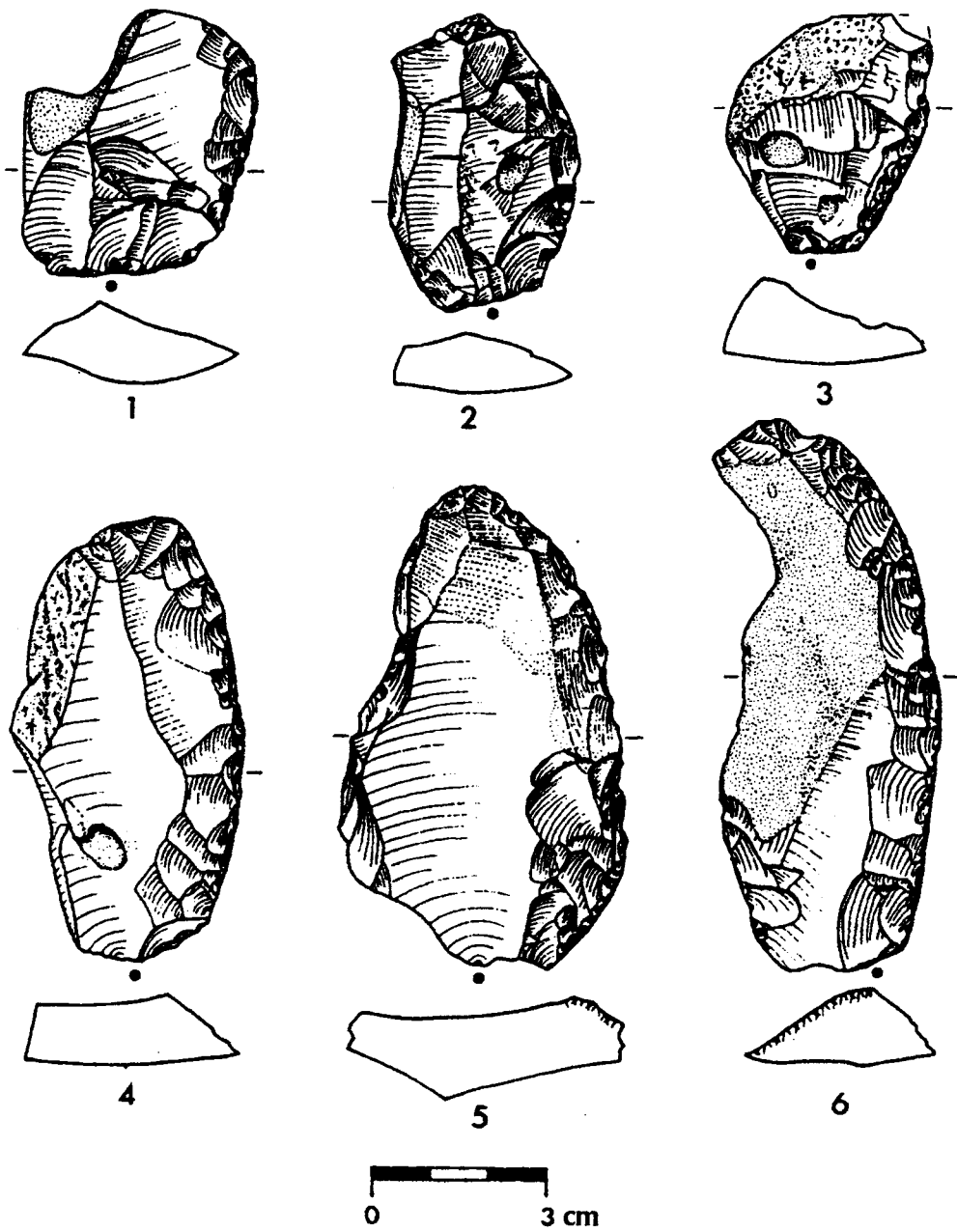


Fig. 7. Upper Series, racloirs

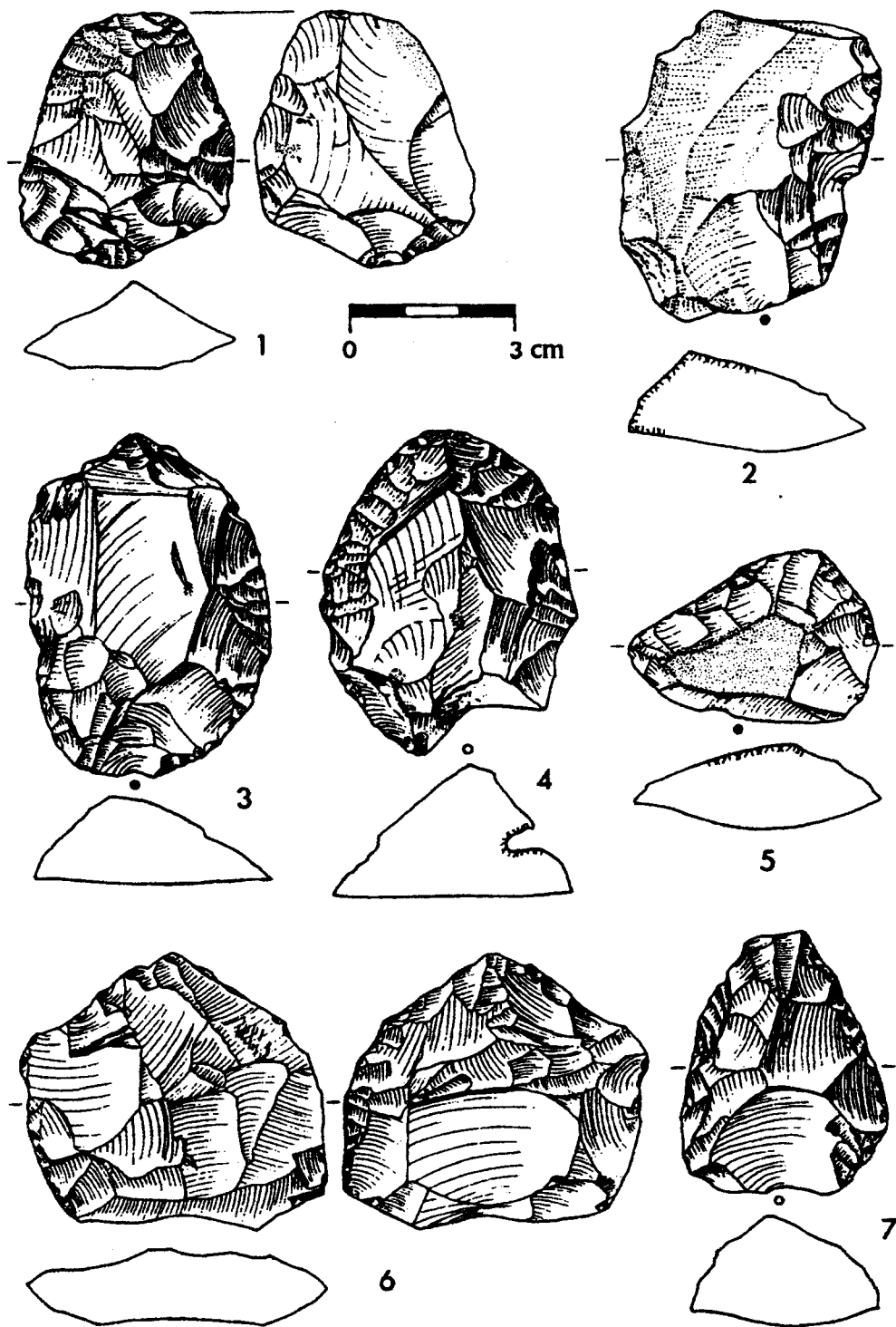


Fig. 8. Upper Series, racloirs

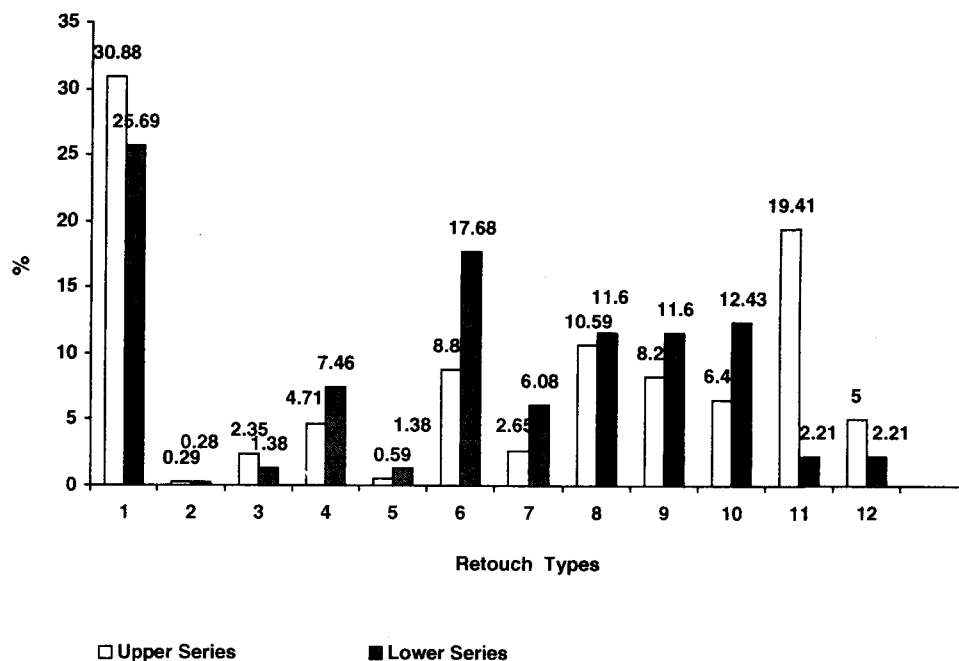


Fig. 10. Distribution of retouch types

- |                  |                       |                |                       |
|------------------|-----------------------|----------------|-----------------------|
| 1 : Scale        | 4 : Fine              | 7 : Steep      | 10 : Clactonian notch |
| 2 : Parallel     | 5 : Coarse, irregular | 8 : Other      | 11 : Step             |
| 3 : Sub-parallel | 6 : Fine irregular    | 9 : Burin blow | 12 : Semi-step        |

## Discussion

The two assemblages discussed here, from layers 62 through 68 of the recent excavations, are both non-Levallois flake industries. The presence of cores combined with the scarcity of primary elements indicate that the initial steps of the operational procedure were taken elsewhere. The assemblages closely resemble each other in their technological aspects: butts are mostly unprepared; the parallel and the opposed dorsal scar patterns dominate; a considerable part of the flakes have a back, mainly on their right edge, either cortical or non-cortical; as a rule, the largest flakes were chosen for further modification. Retouched items characteristically have their butt end narrowed or removed by ventral retouch.

Typologically, the two assemblages differ (Fig. 10, 11). In the upper one Yab-

rudian scrapers dominate with step, or Quina-type retouch while in the lower, "normal" scrapers with scale retouch dominate. Natural backed knives are more frequent in the Lower Series.

The Lower Series is predominantly non-Yabrudian and has no parallel among Jelinek's entities (Fig. 11). It should therefore represent the upper part of Layer F of Garrod, her Upper Acheulean. Our Upper Series is predominantly Yabrudian, comparable to Yabrud and other Yabrudian sites (COPELAND 1983) as well as to Jelinek's "Acheulean Mugharan" (Fig. 11). Hence, it is assigned to the base of Garrod's layer Ed.

## Acknowledgements

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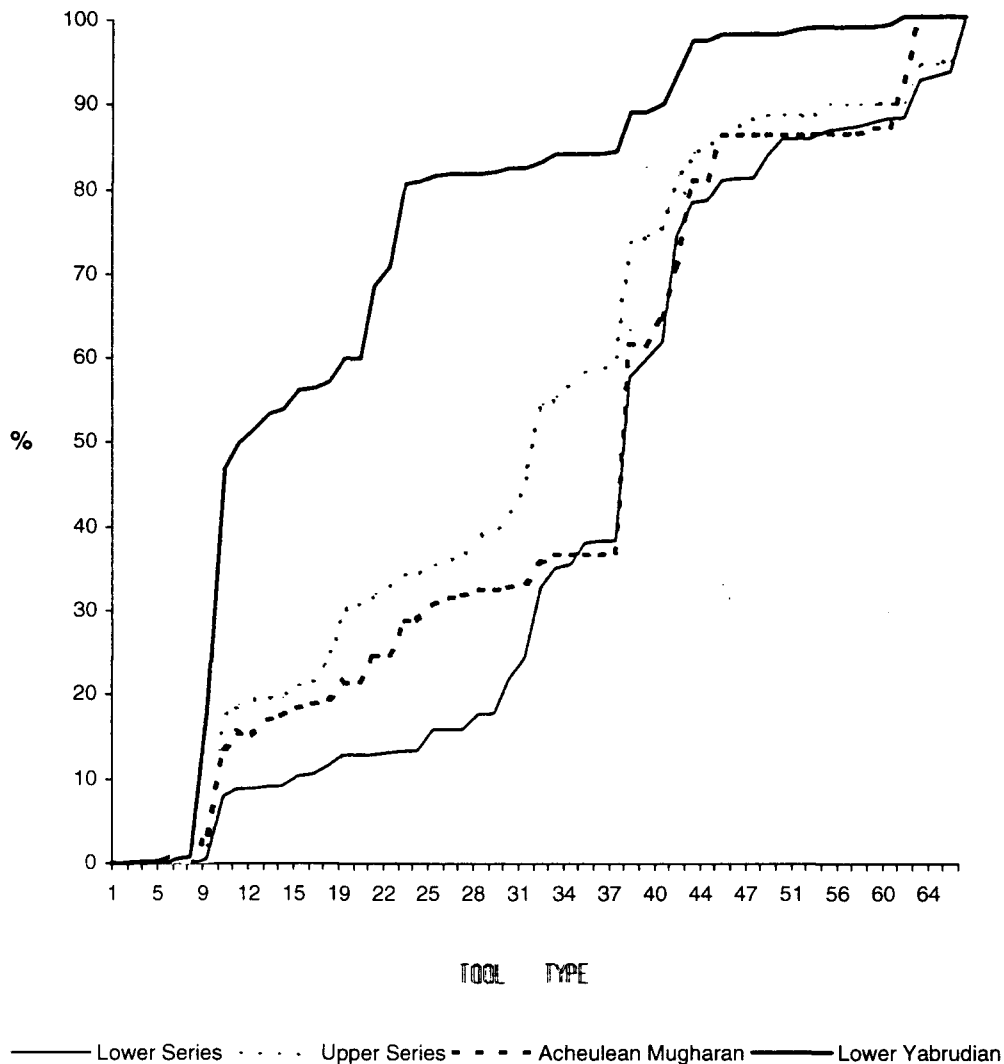


Fig. 11. Comparison between our Series and Jelinek's entities

Fig. 2, Ragna Stidsing for drawing the flint artifacts, Beni Moses for scanning the drawings and Hana Katz, for arranging the tables and graphs.

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